

NCERT QUESTIONS WITH SOLUTIONS

FIGURE IT OUT-01

1. According to the 2011 Census, the population of the town of Chintamani was about 75,000. How much less than one lakh is 75,000?

Sol. One lakh = 1,00,000

$$\text{Now, } 1,00,000 - 75,000 = 25,000$$

Thus, the population of Chintamani in 2011 was 25,000 less than one lakh.

2. The estimated population of Chintamani in the year 2024 is 1,06,000. How much more than one lakh is 1,06,000?

Sol. $1,06,000 - 1,00,000 = 6,000$

Thus, the population in 2024 is 6,000 more than one lakh.

3. By how much did the population of Chintamani increase from 2011 to 2024?

Sol. Increase in population of Chintamani from 2011 to 2024 will be
 $= 1,06,000 - 75,000 = 31,000$

FIGURE IT OUT-02

1. For each number given below, write expressions for at least two different ways to obtain the number through button clicks. Think like Chitti and be creative.

(a) 8300 (b) 40629

(c) 56354 (d) 66666

(e) 367813

Sol. Chitti is a calculator like smart matrix and it has the following buttons: +1, +10, +100, +1000, +10000, +100000 and +1000000.

(a) Way1: $(8 \times 1000) + (3 \times 100)$

$$= 8000 + 300 = 8300$$

$$\text{Way2: } (83 \times 100) = 8300$$

(b) Way1: $(4 \times 10000) + (6 \times 100) + (2 \times 10) + (9 \times 1)$

$$= 40000 + 600 + 20 + 9$$

$$= 40629$$

$$\text{Way2: } (40 \times 1000) + (6 \times 100) + (29 \times 1)$$

$$= 40000 + 600 + 29$$

$$= 40629$$

(c) Way1: $(5 \times 10000) + (6 \times 1000) + (3 \times 100) + (54 \times 1)$

$$= 50000 + 6000 + 300 + 54$$

$$= 56354$$

$$\text{Way2: } (56 \times 1000) + (35 \times 10) + (4 \times 1)$$

$$= 56000 + 350 + 4$$

$$= 56354$$

(d) Way1: $(6 \times 10000) + (6 \times 1000) + (6 \times 100) + (66 \times 1)$

$$= 60000 + 6000 + 600 + 66$$

$$= 66666$$

$$\text{Way2: } (66 \times 1000) + (66 \times 10) + (6 \times 1)$$

$$= 66000 + 660 + 6$$

$$= 66666$$

(e) Way1: $(3 \times 100000) + (6 \times 10000) + (7 \times 1000) + (8 \times 100) + (13 \times 1)$

$$= 300000 + 60000 + 7000 + 800 + 13$$

$$= 367813$$

$$\text{Way2: } (36 \times 10000) + (78 \times 100) + (13 \times 1)$$

$$= 360000 + 7800 + 13$$

$$= 367813$$

FIGURE IT OUT-03

1. For the numbers in the previous exercise, find out how to get each number by making the smallest number of button clicks and write the expression.

Sol. (a) 8300

$$(8 \times 1000) + (3 \times 100) = 8300$$

$$8 \times (+1000) = 8000 \text{ (8 clicks)}$$

$$3 \times (+100) = 300 \text{ (3 clicks)}$$

$$\text{Total clicks: } 8 + 3 = 11$$

(b) 40629

$$(4 \times 10000) + (6 \times 100) + (2 \times 10) + (9 \times 1) = 40629$$

$$4 \times (+10000) = 40000 \text{ (4 clicks)}$$

$$6 \times (+100) = 600 \text{ (6 clicks)}$$

$$2 \times (+10) = 20 \text{ (2 clicks)}$$

$$9 \times (+1) = 9 \text{ (9 clicks)}$$

$$\text{Total clicks: } 4 + 6 + 2 + 9 = 21$$

(c) 56354

$$(5 \times 10000) + (6 \times 1000) + (3 \times 100) + (5 \times 10) + (4 \times 1) = 56354$$

$$5 \times (+10000) = 50000 \text{ (5 clicks)}$$

$$6 \times (+1000) = 6000 \text{ (6 clicks)}$$

$$3 \times (+100) = 300 \text{ (3 clicks)}$$

$$5 \times (+10) = 50 \text{ (5 clicks)}$$

$$4 \times (+1) = 4 \text{ (4 clicks)}$$

$$\text{Total clicks: } 5 + 6 + 3 + 5 + 4 = 23$$

(d) 66666

$$(6 \times 10000) + (6 \times 1000) + (6 \times 100) + (6 \times 10) + (6 \times 1) = 66666$$

$$6 \times (+10000) = 60000 \text{ (6 clicks)}$$

$$6 \times (+1000) = 6000 \text{ (6 clicks)}$$

$$6 \times (+100) = 600 \text{ (6 clicks)}$$

$$6 \times (+10) = 60 \text{ (6 clicks)}$$

$$6 \times (+1) = 6 \text{ (6 clicks)}$$

$$\text{Total clicks: } 6 + 6 + 6 + 6 + 6 = 30$$

(e) 367813

$$(3 \times 100000) + (6 \times 10000) + (7 \times 1000) + (8 \times 100) + (1 \times 10) + (3 \times 1) = 367813$$

$$3 \times (+100000) = 300000 \text{ (3 clicks)}$$

$$6 \times (+10000) = 60000 \text{ (6 clicks)}$$

$$7 \times (+1000) = 7000 \text{ (7 clicks)}$$

$$8 \times (+100) = 800 \text{ (8 clicks)}$$

$$1 \times (+10) = 10 \text{ (1 click)}$$

$$3 \times (+1) = 3 \text{ (3 clicks)}$$

$$\text{Total clicks: } 3 + 6 + 7 + 8 + 1 + 3 = 28$$

2. Do you see any connection between each number and the corresponding smallest number of button clicks?

Sol. The smallest number of button clicks depends on the place value of the digit in the number. If the digit in a particular place is small, then less number of clicks are required and if it is big, then more number of clicks are required.

3. If you notice, the expressions for the least button clicks also give the Indian place value notation of the numbers. Think about why this is so.

Sol. When we write a number using the least button clicks, we divide it into parts like **lakh, thousand, hundred, ten, and one**. These are the same place values we use in the **Indian place value system**, so both look the same.

FIGURE IT OUT-04

1. Read the following numbers in Indian place value notation and write their number names in both the Indian and American systems:

(a) 4050678

(b) 48121620

(c) 20022002

(d) 246813579

(e) 345000543

(f) 1020304050

Sol. (a) Indian System
40,50,678
Forty lakh fifty thousand six hundred seventy-eight.
American System 4,050,678
Four million fifty thousand six hundred seventy-eight.

(b) Indian System
4,81,21,620
Four crore eighty-one lakh twenty-one thousand six hundred twenty.
American System
48,121,620
Forty-eight million one hundred twenty-one thousand six hundred twenty.

(c) Indian System
2,00,22,002
Two crore twenty-two thousand two.
American System:
20,022,002
Twenty million twenty-two thousand two.

(d) Indian System
24,68,13,579
Twenty-four crore sixty-eight lakh thirteen thousand five hundred seventy-nine.
American System
246,813,579
Two hundred forty-six million eight hundred thirteen thousand five hundred seventy-nine.

(e) Indian System:
34,50,00,543
Thirty-four crore fifty lakh five hundred forty-three.
American System:
345,000,543
Three hundred forty-five million five hundred forty-three.

(f) Indian System:
1,02,03,04,050
One arab two crore three lakh four thousand fifty.
American System:
1,020,304,050
One billion twenty million three hundred four thousand fifty.

2. Write the following numbers in Indian place value notation:

- (a) One crore one lakh one thousand ten
- (b) One billion one million one thousand one.
- (c) Ten crore twenty lakh thirty thousand forty.
- (d) Nine billion eighty million seven hundred thousand six hundred.

Sol. (a) In Indian place value notation
1,01,01,010

(b) One billion one million one thousand one - 1,001,001,001
In Indian place value notation -
1,00,10,01,001

(c) In Indian place value notation -
10,20,30,040

(d) Nine billion eighty million seven hundred thousand six hundred -
9,080,700,600
In Indian place value notation -
9,08,07,00,600

3. Compare and write '<', '>' or '=':

- (a) 30 thousand ____ 3 lakhs
- (b) 500 lakhs ____ 5 million
- (c) 800 thousand ____ 8 million
- (d) 640 crore ____ 60 billion

Sol. (a) 30 thousand = 30,000

$$3 \text{ lakhs} = 3,00,000$$

$$30 \text{ thousand} < 3 \text{ lakh}$$

(b) 500 lakhs = 50000000

$$5 \text{ million} = 5000000$$

$$500 \text{ lakhs} > 5 \text{ million}$$

(c) 800 thousand = 800000

$$8 \text{ million} = 8000000$$

$$800 \text{ thousand} < 8 \text{ million}$$

(d) 640 crore = 6400000000

$$60 \text{ billion} = 60000000000$$

$$640 \text{ crore} < 60 \text{ billion}$$

FIGURE IT OUT-05

1. Find quick ways to calculate these products:

(a) $2 \times 1768 \times 50$

(b) 72×125 [Hint: $125 = \frac{1000}{8}$]

(c) $125 \times 40 \times 8 \times 25$

Sol. (a) $2 \times 1768 \times 50 = 2 \times 1768 \times \frac{100}{2}$

$$= 1768 \times 100 = 176800$$

(b) $72 \times 125 = 72 \times \frac{1000}{8}$

$$= 9 \times 1000 = 9000$$

(c) $125 \times 40 \times 8 \times 25$

$$= \frac{1000}{8} \times 40 \times 8 \times \frac{100}{4} = 10,00,000$$

2. Calculate these products quickly.

(a) $25 \times 12 =$ _____

(b) $25 \times 240 =$ _____

(c) $250 \times 120 =$ _____

(d) $2500 \times 12 =$ _____

(e) _____ $\times$ _____ = 120000000

Sol. (a) $25 \times 12 = 25 \times 4 \times 3 = 100 \times 3 = 300$

(b) $25 \times 240 = 25 \times 4 \times 60$

$$= 100 \times 60 = 6000$$

(c) $250 \times 120 = 250 \times 4 \times 30$

$$= 1000 \times 30 = 30000$$

(d) $2500 \times 12 = 2500 \times 4 \times 3$

$$= 10000 \times 3 = 30000$$

(e) $25000 \times 4800 = 25000 \times 4 \times 1200$

$$= 100000 \times 1200 = 120000000$$

FIGURE IT OUT-06

1. Using all digits from 0 – 9 exactly once (the first digit cannot be 0) to create a 10- digit number, write the —

(a) Largest multiple of 5

(b) Smallest even number

Sol. (a) To form the largest multiple of 5, the last digit must be 0 or 5.

Arranging the digits in decreasing order, the largest multiple of 5 is 9876543210 (10 digits).

(b) To form the smallest even number, the last digit must be even (0, 2, 4, 6, 8), and the digits should be written in ascending order.

The even number is 1023456798 (10 digits).

2. The number 10,30,285 in words is Ten lakhs thirty thousand two hundred eighty five, which has 43 letters. Give a 7-digit number name which has the maximum number of letters.

Sol. 78,78,773 (Seventy-eight lakhs seventy-eight thousand seven hundred seventy-three). This has 61 letters, making it one of the longest 7-digit numbers.

3. Write a 9-digit number where exchanging any two digits results in a bigger number. How many such numbers exist?

Sol. To ensure swapping any two digits increases the value, the digits must increase from left to right.

So, the arrangement would be: 123456789.

There is only 1 such number.

4. Strike out 10 digits from the number 12345123451234512345 so that the remaining number is as large as possible.

Sol. The given number is 12345123451234512345.

Removing the 10 highlighted digits from left to right: 12345123451234512345

The number we get is 5534512345, which is the largest possible number.

5. The words 'zero' and 'one' share letters 'e' and 'o'. The words 'one' and 'two' share a letter 'o', and the words 'two' and 'three' also share a letter 't'. How far do you have to count to find two consecutive numbers which do not share an English letter in common?

Sol. Let's list the spellings of some numbers and check for shared letters between consecutive numbers.

1. **Zero** (Z, E, R, O) and **One** (O, N, E) - Share 'e' and 'o'.
2. **One** (O, N, E) and **Two** (T, W, O) - Share 'o'.
3. **Two** (T, W, O) and **Three** (T, H, R, E, E) - Share 't'.

4. **Three** (T, H, R, E, E) and **Four** (F, O, U, R) - Share 'r'.

5. **Four** (F, O, U, R) and **Five** (F, I, V, E) - Share 'f'.

6. **Five** (F, I, V, E) and **Six** (S, I, X) - Share 'i'.

7. **Six** (S, I, X) and **Seven** (S, E, V, E, N) - Share 's'.

8. **Seven** (S, E, V, E, N) and **Eight** (E, I, G, H, T) - Share 'e'.

9. **Eight** (E, I, G, H, T) and **Nine** (N, I, N, E) - Share 'e', 'i'.

10. **Nine** (N, I, N, E) and **Ten** (T, E, N) - Share 'e', 'n'.

Similarly, we can check for any two consecutive numbers.

Therefore, there are no consecutive numbers that do not share a letter in common.

6. Suppose you write down all the numbers 1, 2, 3, 4, ..., 9, 10, 11, ... The tenth digit you write is '1' and the eleventh digit is '0', as part of the number 10.

(a) What would the 1000th digit be? At which number would it occur?

(b) What number would contain the millionth digit?

(c) When would you have written the digit '5' for the 5000th time?

Sol. (a) **1-digit numbers (1-9):** There are 9 numbers. Each number uses 1 digit. Total digits: $9 \times 1 = 9$ digits. The 9th digit is '9' (from the number 9).

2-digit numbers (10-99): There are $99 - 10 + 1 = 90$ numbers. Each number uses 2 digits. Total digits:

$90 \times 2 = 180$ digits. Cumulative digits up to 99: $9 + 180 = 189$ digits. The 189th digit is '9' (from the number 99).

3-digit numbers (100-999): There are $999 - 100 + 1 = 900$ numbers. Each number uses 3 digits. Total digits: $900 \times 3 = 2700$ digits. Cumulative digits up to 999: $189 + 2700 = 2889$ digits.

To find the 1000th digit:

Digits so far: $9 + 180 = 189$.

So, the 1000th digit will lie in the 3-digit numbers range.

Remaining digits: $1000 - 189 = 811$.

Number of 3-digit numbers to reach 811 digits:

$811 \div 3 = 270$, with 1 remaining number.

Thus, first we need to write the first 270 3-digit numbers starting from 100.

So, the 270th 3-digit number $= 100 + 270 - 1 = 369$.

The next number is 370.

Thus, the 1000th digit is the 1st digit of 370, which is 3.

(b) **4-digit numbers (1000-9999):**

There are $9999 - 1000 + 1 = 9000$ numbers. Each number uses 4 digits. Total digits: $9000 \times 4 = 36,000$ digits. Cumulative digits up to 9999: $2889 + 36000 = 38,889$ digits.

5-digit numbers (10000-99999):

There are $99999 - 10000 + 1 = 90,000$ numbers. Each number uses 5 digits. Total digits: $90,000 \times 5 = 450,000$ digits. Cumulative digits up to 99999: $38,889 + 450,000 = 488,889$ digits.

6-digit numbers (100000-999999):

There are $999999 - 100000 + 1 = 900,000$ numbers. Each number uses 6 digits. Total digits: $900,000 \times 6 = 5,400,000$ digits.

To reach the millionth digit:

Upto 5-digit numbers: $9 + 180 + 2700 + 36,000 + 4,50,000 = 4,88,889$

Remaining digits in the 6-digit range: $1,000,000$ (or $(10,00,000) - 4,88,889 = 5,11,111$

The number of 6-digit numbers required: $5,11,111 \div 6 = 85,185$, with 1 remaining number.

So, the 85,185th 6-digit number is $85,185 + 1,00,000 - 1 = 1,85,184$.

The millionth digit occurs in the number $185184 + 1 = 1,85,185$.

(c) **Single-digit numbers (1-9):**

5 occurs only 1 time

Two-digit numbers (10-99)

(15, 25, 35, ..., 95), 5 occurs 9 times.

50, 51, 52, ..., 59, 5 occurs 10 times.

Thus, 5 occurs 20 times in two digit numbers.

Three-digit numbers (100-999)

(i) Unit's place: In numbers like 105, 115, ..., 995, 5 occurs 90 times.

(ii) Ten's place: In numbers like 150-159, 250-259, ..., 950-959, 5 occurs 90 times.

(iii) Hundred's place: In numbers like 500-599, 5 occurs 100 times.

Thus, 90 (unit's place) + 90 (ten's place) + 100 (hundred's place) = 280 occurrences

Total occurrences so far: $20 + 280 = 300$

Four-digit numbers (1000-9999)

(i) Unit's place: In numbers like 1005, 1015, ..., 9995, 5 occurs 900 times.

(ii) Ten's place: In numbers like 1050-1059, 1150-1159, ..., 9950-9959, 5 occurs 900 times

(iii) Hundred's place: In number like 1500-1599, 2500-2599, ..., 9500-9599, 5 occurs 900 times.

(iv) Thousands position: 5000-5999, 5 occurs 1000 times

Adding these up: 900 (unit's place) + 900 (ten's place) + 900 (hundred's place) + 1000 (thousand's place) = 3700 occurrences

Total occurrences so far:

$$300 + 3700 = 4000$$

Five-digit numbers (starting from 10000)

(i) In 10001-10999:

For the 5000th number, we require $5000 - 4000 = 1000$ more numbers that lie in 10001-10999.

Among 10000-10999, one digit 5 appears in 100 numbers (e.g., 10005, 10015, ..., 10995).

The digit 5 appears in 100 numbers (e.g., 10050-10059, ..., 10950-10959).

The digit 5 appears in 100 numbers (e.g., 10500-10599).

Total occurrences so far:

$$4000 + 300 = 4300$$

(ii) In 11000-11999

5 at unit's place = 100 times

5 at ten's place = 100 times

5 at a hundred's place = 100 times

Total occurrences so far:

$$4300 + 300 = 4600$$

(iii) In 12000-12999

5 at unit's place = 100 times

5 at ten's place = 100 times

5 at a hundred's place = 100 times

Total occurrences so far:

$$4600 + 300 = 4900$$

(iv) In 13000- 13999

5 occurs at unit place in numbers 13005, 13015

So, 5 occurs for 5000th time in 100th number starting from 13005 i.e. 13995

Required number = 13995

7. A calculator has only '+10,000' and '+100' buttons. Write an expression describing the number of button clicks to be made for the following numbers:

(a) 20,800

(b) 92,100

(c) 1,20,500

(d) 65,30,000

(e) 70,25,700

Sol. (a) $20,800 = 2 \times 10,000 + 8 \times 100$

Number of clicks = $2 + 8 = 10$ clicks

(b) $92,100 = 9 \times 10,000 + 21 \times 100$

Number of clicks = $9 + 21 = 30$ clicks

(c) $1,20,500 = 12 \times 10,000 + 5 \times 100$

Number of clicks = $12 + 5 = 17$ clicks

(d) $65,30,000 = 653 \times 10,000 + 0 \times 100$

Number of clicks = $653 + 0$

= 653 clicks

(e) $70,25,700 = 702 \times 10,000 + 57 \times 100$
 Number of clicks = $702 + 57 = 759$
 clicks

8. How many lakhs make a billion?

Sol. 1 lakh = 1,00,000

1 billion = 1,000,000,000

1 billion = $10,000 \times 100,000$

1 billion = 10,000 lakhs

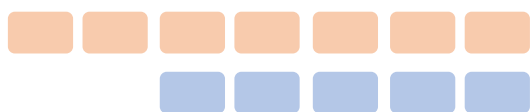
Thus, 10,000 lakhs make a billion.

9. You are given two sets of number cards numbered from 1 – 9. Place a number card in each box below to get the

(a) largest possible sum

(b) smallest possible difference of the two resulting numbers.

Sol.



Total Available Digits:

From two sets of digits 1 to 9:

Each digit from **1 to 9** appears **twice**.

So, total **18 digits** to be used.

(a) Greatest 7 digit number using 18 digits = 9988776

Greatest 5 digit number using remaining 11 digits = 65544



Largest possible sum = $9988776 + 65544 = 10054320$

(b) Smallest 7 digit number using 18 digits = 1122334

Greatest 5 digit number using remaining 11 digits = 99887



Smallest possible difference

= $1122334 - 99887 = 1022447$

10. You are given some number cards; 4000, 13000, 300, 70000, 150000, 20, 5. Using the cards get as close as you can to the numbers below using any operation you want. Each card can be used only once for making a particular number.

(a) 1,10,000: Closest I could make is $4000 \times (20 + 5) + 13000 = 1,13,000$

(b) 2,00,000

(c) 5,80,000

(d) 12,45,000

(e) 20,90,800:

Sol. (a) $4000 \times (20 + 5) + 13000$
 = $4000 \times 25 + 13000$
 = $100000 + 13000$
 = 113000

This gives us 1,13,000, which is very close to 1,10,000.

(b) $1,50,000 + 70,000 - 4000 \times 5$
 = 2,00,000

(c) $70,000 \times 5 + 4,000 \times 20 + 1,50,000$
 = 5,80,000

(d) $70,000 \times 20 - 300 \times 5 - 4,000 - 1,50,000 = 12,44,500$

This gives us 12,44,500, which is very close to 12,45,000.

(e) $13,000 \times 300 - 70,000(20 + 5) + 4,000 - 1,50,000 = 20,04,000$

11. Find out how many coins should be stacked to match the height of the Statue of Unity. Assume each coin is 1 mm thick.

Sol. Approximate height of the Statue of Unity is 182 m = 1,82,000 mm
(Since 1 m = 1000 mm)
Thickness of one coin = 1 mm
Number of coins needed = $1,82,000 \text{ mm} \div 1 \text{ mm} = 1,82,000$ coins

12. Grey-headed albatrosses have a roughly 7-feet wide wingspan. They are known to migrate across several oceans. Albatrosses can cover about 900 – 1000 km in a day. One of the longest single trips recorded is about 12,000 km. How many days would such a trip take to cross the Pacific Ocean approximately?

Sol. Time = $\frac{\text{Distance}}{\text{Speed}}$

To estimate the number of days, divide the total distance by the daily distance covered.

If the albatross flies 900 km per day.

$$\frac{12000 \text{ km}}{900 \text{ km/day}} = 13.33 \text{ days} \approx 13 \text{ to } 14 \text{ days}$$

If the albatross flies 1000 km per day.

$$\frac{12000 \text{ km}}{1000 \text{ km/day}} = 12 \text{ days}$$

It would take approximately 12 to 14 days for a grey headed albatross to complete a 12,000 km journey across the Pacific Ocean, depending on its flying speed.

13. A bar-tailed godwit holds the record for the longest recorded non-stop flight. It travelled 13,560 km from Alaska to Australia without stopping. Its journey started on 13 October 2022 and continued for about 11 days. Find out the approximate distance it covered every day. Find out the approximate distance it covered every hour.

Sol. Total distance = 13,560 km and duration = 11 days

Approximate distance covered every day = $13,560 \div 11 \sim 1,233 \text{ km/day}$.

Thus, the godwit covers approximately 1,233 km per day.

One day = 24 hours

Approximate distance covered every hour = $1,233 \div 24 \sim 51 \text{ km/hour}$.

Thus, the godwit covers approximately 51 km per hour.

14. Bald eagles are known to fly as high as 4500 – 6000 m above the ground level. Mount Everest is about 8850 m high. Aeroplanes can fly as high as 10,000 – 12,800 m. How many times bigger are these heights compared to Somu's building (44 m tall)?

Sol. Let's compare these heights to Somu's building:

Bald eagle: 4500 – 6000 m;

Mount Everest: 8850 m;

Aeroplanes: 10,000 – 12,800 m

Somu's building is 44 m tall.

Heights compared to Somu's building:

Bald eagle: $(4500 \div 44 \sim 102)$ to

$(6000 \div 44 \sim 136)$

The bald eagle's flying height is 102 – 136 times higher.

Mount Everest: $8850 \div 44 = 201$

Mount Everest is 201 times bigger.

Aeroplanes: $(10,000 \div 44 \sim 227)$ to $(12,800 \div 44 \sim 291)$

An aeroplane's flying height is 227 – 291 times higher.